1.4 Distinct or Coincident Lines

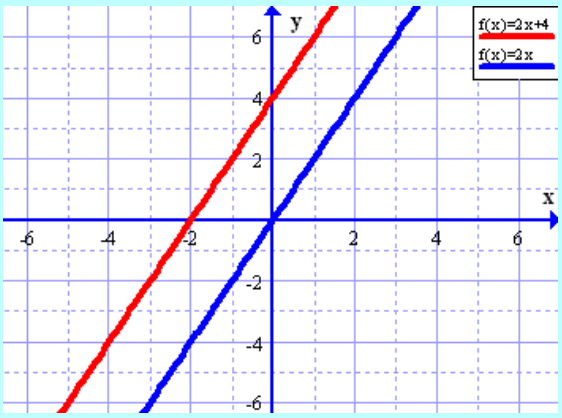
Remember the linear systems that we solved by graphing in our first lesson?

a) $y = 2x + 4$
$y = 2x$

b) $y = 2x + 4$
$y = - x + 4$

c) $y = x - 3$
$4x - 4y = 12$

a) $y = 2x + 4$
$y = 2x$



These lines are parallel and distinct, there was no solution to the system.

What would happen when you solve this system algebraically?

Solve the following linear system using an algebraic m ethod.

a) $y = 2x + 4$

$y = 2x$

$y = 2x + 4$

$(2x) = 2x + 4$

$2x - 2x = 2x + 4 - 2x$

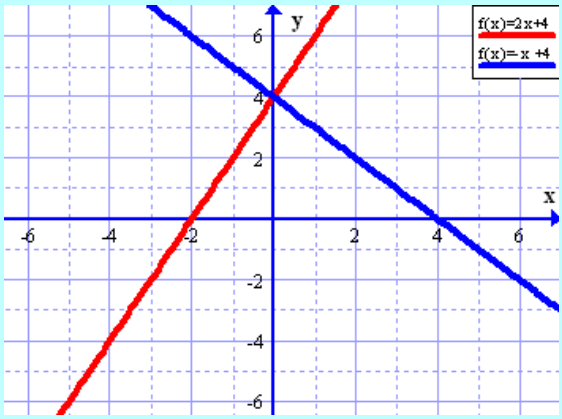
$\frac{0x}{0} = \frac{4}{0}$

$=$ error

Can not divide by zero - error!! No Solution lines are distinct

b) $y = 2x + 4$

$y = -x + 4$



These lines are not parallel, there was **one** solution to the system.

What would happen when you solve this system algebraically?

Solve the following linear system using an algebraic m ethod.

b) $y = 2x + 4$
$y = -x + 4$

$2x+4 = -x+4$

$2x+x = 4-4$

$\frac{3x}{3} = \frac{0}{3}$

$x = 0$

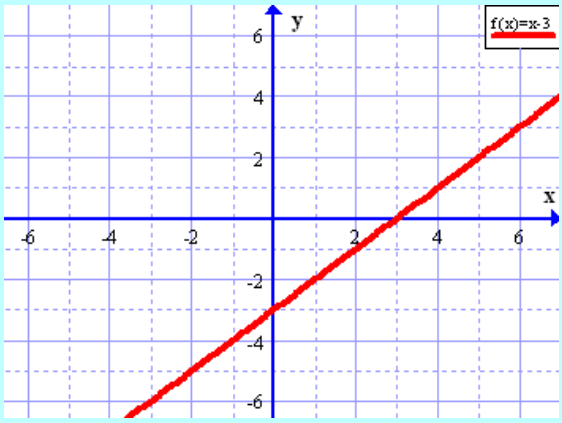
sub $x=0$ into ①

$y = 2(0)+4$

$y = 4$

∴ the POI is $(0,4)$

c) $y = x - 3$
$4x - 4y = 12$



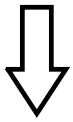
These lines are the same (coincident), there were **infinitely many** solutions to the system.

What would happen when you solve this system algebraically?

Solve the following linear system using an algebraic m ethod.

c) $y = x - 3$
$4x - 4y = 12$

$4x - 4(x-3) = 12$
$4x - 4x + 12 = 12$
$4x - 4x = 12 - 12$
$0x = 0$ Always true



When solving a linear system algebraically:

Exactly One Solution:
- you can find the value of one of the variables and then solve for the other.

Assigned Work: p. 59 # 1, 2a, 3abcfh, 4, 6*

No Solution:
- you end up with an untrue statement.
e.g. 0x = 2 is never true
- these lines are distinct.

Infinitely Many Solutions:
- you end up with a statement which is true for any value of x.
- 0x = 0 is always true
- these lines are coincident.